West Coast, with visits to the interior, up most of the rivers, reaching Cape Town, and going thence to Delagoa Bay, and so to the East Coast. He wished it to be understood that his friend, Mr. Guest, had assisted him in preparing the paper, and, for the reason he had given, Dr. Mann would be kind enough to read it.

The paper read was—

(2)

THE PRINCIPAL CAUSES OF DISEASE IN TROPICAL COUNTRIES.

By Alexander William Mitchinson.

The greatest impediment in the way of the development of some of the most favoured portions of the earth is the unwillingness to settle permanently within the tropics that characterises certain nations, otherwise remarkable for their colonising energy. This disinclination to colonise tropical countries doubtless arises from mistrust of what is called the climate. It is on all hands allowed that climate exercises a great influence on health and disease, and it is usual to speak of a climate as if it were an element, like the wind or the rain, and to attribute to it either virtues or evil properties, according to our conception of its character. But what is climate? What constitutes a bad, and what a good climate? Is a climate to be called bad in which a black man can happily and contentedly live the full term of his life, because in it the white man can only count upon a diminished term of existence? Is our temperate climate to be stigmatised as bad because it rapidly kills off natives of the tropics who do not adopt a different manner of clothing and feeding themselves here from that which has kept them in contented health at home? If a native of tropical Africa, residing in Europe, were to limit his food in quantity, nature, and quality to that which is sufficient to maintain life in his own climate, his bodily and mental condition would rapidly deteriorate, and he might, with equal reason, allege that he was being poisoned by the climate of Europe. If the views put forward in this paper are held to be true, it will be admitted that health in the tropics, as everywhere else, is much more dependent upon diet and habit of body and mind—and, in towns and villages, upon good sanitary regulations—than upon what is known as the "medical climate" of a given place, or upon the barometrical, thermometrical, and hygrometrical variations peculiar to a given district. It will be admitted, in short, that acclimatisation is more of an educational than a physical process, and that when a European has learnt correctly to apply the principles of hygiene, he may live his life in the tropics with equal or greater certainty than in temperate climates. It may be said, indeed, that though there are good and bad situations, swamps, and malarious localities, there is, in the common sense of the term, no such thing as a bad climate. All climates are good for man to live in if he applies intelligently the principles of sanitary science to the regulation of his life. But the same cannot be said of all localities. There are towns in Africa which, like Bathurst, on the Gambia River, Delagoa Bay, in South Africa, and a large number of others, are pitched on sites the worst possible, sites that could hardly have been deliberately selected on any intelligible principle, but must have been pitched upon almost haphazard by the earliest European settlers. Many of these sites are scarcely raised above the level of the sea, and some are even, in part, below it; so that drainage is practically impossible, filth cannot be removed, and, in short, all the worst sanitary conditions of the worst periods of the most neglected spots of Europe are intensified and aggravated in the badly-situated towns of Africa. How, then, can the death-rate be otherwise than high? That man can exist at all under such horrible infractions of every sanitary law is itself a proof that the general climate is excellent and favourable to health. It is just as absurd to charge on "the climate" the high mortality of a pestilential African town site, as it would have been to call the climate of London bad when the Fleet Ditch was an open sewer.

Climate, if it is capable of definition as a distinct conception, may be said to be the sum of the meteorological influences that affect a given region of the earth, including in the term meteorological influences, not only the influence of elevation and of latitude, but that of the internal heat of the globe, the geological structure of the earth's crust, the topographical condition of its surface, the quantity and quality of water, the currents of water and of the air, and the distribution of vegetable and animal life, including human population. Except in so far as it may affect a region generally, it is illogical to speak of the climate of swamps and malarious places, just as it would be absurd to say that the atmosphere of Barking Reach, at ebb tide in summer, represented the climate of Kent. The conditions in both cases are quite exceptional, and the risks are exceptional also. The distinction is important, because it constantly happens that whole regions are condemned as having a bad climate, simply because careless settlers have built upon a malarious swamp, and equally careless traders have followed upon their foundations, when a little search would have enabled both to find, and generally within a short distance, a much more eligible situation.

There are within the topics but few variations of temperature, the greatest range of variation being in the parts most distant from the equator. The thermometer generally rises higher on the plains than in the mountains, but this will be idfluenced to some extent by geographical position or geological formation. The variations are greater in summer than in winter, and, as we might expect, the range of variation is less on the coast than in the inland districts.

The study of the meteoric causes of disease has engaged, and is still engaging, the attention of many scientific men, and careful meteorological observations are very properly recorded by travellers in tropical climates; but those who have attempted to apply the data of meteorological science to the healing art have, as yet, had but a small modicum of success. Without denying the importance of the study of that science, or questioning the value of many of its facts, it is open to great doubt whether a too great reliance on meteorology by a physician does not frequently blind him to the real causes of disease and lead him far astray in his efforts to prescribe remedies. I have no hesitation in affirming that, if we could establish a system of registration in these tropical climates, which would furnish us with reliable statistics as to the variations of the death-rate from month to month, and from season get hot air for burning the gas, though we do not for making the gas. This is not a disadvantage in this case, for we have not the reserve of heat in lime burning as we had with clay goods. The air can pick up the whole of this; therefore, there is no object in turning it into the gas-producers. In the case of clay goods, the heat available for utilisation was two-thirds of the whole; but with lime, owing to the vast amount of heat taken away latent in the carbonic acid gas, it is only one quarter of the whole. Here, then, while we retain all the advantages of the old rough-and-ready way of tipping the stone in at the top, we obtain, also, all the advantages of the best continuous system. There is another peculiarity worth noticing. There is a sloping part of the shaft just above the hottest part of the kiln. The object of this is threefold: firstly, the heat and draught is not so likely to keep to one channel, but has a tendency to cross the stream of descending stone; secondly, the stone has a tendency to roll over and change place in the opposite direction to the heat; and, thirdly, the slope carries a great part of the weight of the stone above it, which, with limes and cements that have a tendency to clinker, is a great advantage. With such materials, I should form the hottest part of the kiln with a slight taper, so that there would be a constant tendency to relieve the material of pressure so long as there was any fear of clinkering. So far as fuel is concerned, I do not suppose this kiln will be much more economical than any other good continuous kiln. It will gain a little, however, upon such a kiln as the Hoffmann, where the fuel is put along with the lime, and a small extra loss incurred by the mixture of ashes. In the kiln before you, not a particle of ashes gets along with the lime, the whole coming out pure, and requires no more sorting than perhaps the picking out of a stone occasionally. Small or large, it is good clean lime, and can be sold as such. The gain altogether of such a kiln over a horizontal, for the same purpose, is very great, for the labour in setting the stone and taking it out again in the horizontal system is considerable, while, with the vertical system, both the tipping in and the raking out is a mere trifle.

And now, hoping I have not altogether wasted your time or exhausted your patience, I must bring my paper to a close.

DISCUSSION.

Mr. Guthrie explained, on the diagrams he had prepared, the mode he had adopted of calculating the amount of heat passing up the chimney of his kiln upon the basis of the amount given off in ordinary non-continuous kilns.

The Chairman said the gentlemen present would agree that anyone who should discover an improved and more economical method of making bricks and tiles, and for the construction of better furnaces and kilns for burning pottery, was really deserving of national thanks. He did not think there was any subject of greater interest than that of how best and most effectually and economically to burn pottery. Attention had been very much directed of late years to the subject, and the suggestions now thrown out in the interesting paper just read were certainly very valuable. If the man who made two blades of grass to grow where but one had grown before was, as had been often said, a public benefactor, surely general thanks were due to Mr. Guthrie, who appeared to have discovered a method of making one ton of coal do the work in that direction which had hitherto required two. There could be no question that in such a system there must be great advantage; but there was still the practical difficulty that unfortunately manufacturers could not get continuous orders for the same class of goods, or indeed continuous orders at all, so that it would be very difficult to keep a manufactory supplied with the regularity which any scientific system, such as Mr. Guthrie's, appeared to require. He thought that of all the beautiful systems at present in operation, Hoffmann's plan seemed to be the most perfect. He had one of Hoffmann's kilns at work in Lancashire, and he could state that the work it did was most cleanly, and that the quantity of fuel burnt in it was very small. As a proof that the whole of the heat was abstracted in the kiln, he found that the chimney itself was simply warmed, just enough to create a draft. In short, he considered Hoffmann's a very perfect system, and efforts had been made to apply it to the burning of pottery. He might say that this system of burning pottery was not altogether new to him, for he had made experiments with it in Lancashire, in 1869, and had succeeded in burning pottery very satisfactorily by it, but he had found there were expenses and disadvantages which induced him to abandon it for the time, although he would not by any means say that it was a system which was not likely to be carried to success in the future. It was undoubtedly a cleanly process, and in many respects a very beautiful one. Mr. Guthrie's speciality, as he understood, was in the management of the kiln or gas-producer itself, and it was impossible to say without seeing detailed diagrams, and going fully into the matter, how far Mr. Guthrie had been able to effect his object with any permanent success; but if he had really been successful in doing so without any accompanying disadvantages, he would, no doubt, be entitled to the greatest thanks for his labours. As no one present seemed disposed to carry on the discussion, he would not detain the meeting with further remarks, but would simply add that he felt they were all greatly indebted to Mr. Guthrie for his very able paper on a most interesting subject, and they would, probably, even better appreciate the paper when they had the opportunity of reading it in the *Journal*, and could see how evidently it was the result of long and hard work. Pottery manufacture was a most seductive art, and one in which there had been, and would continue to be, continuous improvement, for people who knew anything at all about it, would acknowledge that they knew a great deal more about it when they had had ten years' experience in it than when they had had but one, and far less even after a ten years' knowledge of it than when they had had a twenty years' experience. He had only, in conclusion, to invite a vote of thanks to Mr. Guthrie for his able and interesting paper.

The vote was carried unanimously, and the meeting terminated.

FOREIGN AND COLONIAL SECTION.

Tuesday, February 17th, 1880; Dr. B. W. Richardson, F.R.S., Member of the Council, in the chair.

Mr. Mitchinson said he had not had much opportunity of studying the English language until lately, and was not a physician; but the opinions stated in the paper about to be read were the result of personal observation in various parts of the world. He had visited Moscow, St. Petersburg, and the University of Leipzig, and, since then, had travelled in nearly all parts of Africa, going down the to season, we should make a greater advance towards a knowledge of the true causes of disease in the course of a decade than by meteorological studies alone during a century. The contradictory directions given by different medical men to persons proposing to visit the tropics, and the want of intelligence which such persons often show in their interpretation of these directions, afford the strongest proofs both of our ignorance of the true causes of tropical mortality, and of the great importance of our not remaining longer in that ignorance. Many physicians recommend a generous diet, intended to fortify the constitution of travellers bound for a tropical country; and this advice, though good in principle, being wrongly interpreted, encourages inordinate feeding on board the steamer which takes the traveller out. This first error is a serious one, and often leads to the worst consequences at the outset. Some doctors, again, will recommend you never to start on a journey without eating. Too much food is taken, and the stomach having a greater task to perform than it is capable of, a breakdown ensues. Others advise an adherence to regular meals at fixed hours, and, under this system, the human organism is converted into a machine, depending for its efficiency upon strict regularity; but the conditions of out-door life, in the circumstances of most of us, are necessarily varying and irregular, and the mechanically fed body, like the machine it has come to resemble, is, therefore, constantly getting out of order.

Most of the diseases, attributed in a vague manner to climate, in the erroneous popular use of the term, are, in fact, caused by wrong dietary usages. Every country and climate has its own appropriate dietary laws—unwritten laws, for the most part—but rules appropriate to Europe may be quite inapplicable in Africa. Forgetful of this, Europeans in the tropics, instead of reducing the quantity and varying the nature of their food on intelligent principles, too often insist on taking, in the same or even increased quantity, the rich foods, wines, spirits, and condiments they have been accustomed to in Europe. The stomach, with power diminished by climatic conditions and the burden of a task which it is unable to perform cast upon it, fails to digest all it has been forced to receive, and evinces its distress by causing the usual symptoms of such tropical disorders as are commonly charged against the climate. The circulation of the blood becomes abnormally quick or slow, and the subject either becomes restless and irritable or listless and sleepy, with an overpowering sense of fatigue and desire for rest. The heat of the climate is supposed to cause this abnormal state of the nervous system; but, in reality, dry heat aids the process of digestion, and, other things being equal, if heat were absent, the worst symptoms of an overloaded stomach would be more quickly developed. A high temperature tends to increase the circulation by drawing the blood to the surface; and so to mitigate the symptoms of disease through diminishing the power of the heart's action; and also modifies the respiration, by lessening the quantity of oxygen in the atmosphere. The evil moral effects of overfeeding are strongly accentuated in tropical climates. The mind and the memory, as well as the animal passions, are more powerfully affected by the adoption of a too rich or a too poor diet, and the physiognomy registers, in a remarkably faithful manner, the nature of the disorganisation taking place in the nervous system in consequence of a departure from the dietary law proper to the region.

One of the most remarkable effects of a long residence in the tropics is loss of memory and of mental capacity. This derangement is due, in a measure, to tropical heat, but not to the extent commonly believed. Too much solitude, insufficient variety of incident, and, above all, want of mental exercise, are in a far greater degree responsible for the disease than the enervating effect of climatic heat. Even in Europe, with all the incentives to mental activity that surround us, we often find persons more ignorant at an advanced period of life than during their school days; but, with the distraction and currents of thought caused by contact with more active neighbours, it is impossible for the most sluggish mind in Europe, except in very isolated places, to fall into that dreamy, passive state to which the monotony of life in Africa so easily disposes. Europeans in Africa do little else than eat and drink, rest and sleep. They seek for nothing to occupy the mind, and they will often sit for hours gazing at vacancy, with their thoughts swimming in clouds or jumping from one subject to another, undirected and unrestrained, until, from want of judicious exercise, the mind gradually sinks and perishes, and the man becomes either a hopeless imbecile or a violent madman.

Solitude, and the monotony of tropical life, in the case of the white man, have a strong tendency to produce nervous prostration and debility. When a man has allowed himself to lapse into this state of mental apathy, he is far more liable to an attack of fever than one who preserves his mind in a state of healthy vigour, by forcing it, if need be, to think, reflect, compare, and remember. The connection between mental and physical weakness is strongly marked in the tropics. Imaginary sicknesses developing into real ones is a common phenomenon in all climates; but, in tropical Africa, I am of opinion that no less than 75 per cent. of the prevailing disease is of that character which, without the application of medicinal remedies, may be cast off, simply by the exercise of a strong will, and of intellectual and moral power. But the power of the brain is supposed to be weakened by climatic heat, and, no doubt, long-continued mental effort in the tropics is, in a peculiar degree, exhausting. The exhaustion is not the result, however, of any direct action of heat on the brain, for the intellect is as vigorous, clear, and enduring in a hot as in a temperate climate. Headaches, which are so common in Africa, and the tired feeling in the brain which there more readily follows mental exertion than in Europe, are the results of the direct action of heat, not on the brain, but on the blood, which, if not maintained in a normal state by judicious diet and bodily exercise, reacts on the brain to produce the feeling of fatigue. The power of the brain would, in any climate, be prejudicially affected by overcharging the stomach. The action of climatic heat on the blood requires to be counteracted by reducing the quantity and quality of food; but, under the impression that the exhaustion of the climate must be met by more and richer food, Europeans often increase the quantity, and eat, in fact, nearly twice as much as nature requires. The ham, cheese, nuts, fruits, cucumbers, condiments, and even narcotics, they have been accustomed to in Europe, must all be swallowed in due course, and the distresses of the stomach and brain which necessarily follow are set down to the climate. If Europeans would live more consistently with nature, disease and mortality would greatly diminish, and the brain would be as capable of continued exertion in the tropics as anywhere else. The deficiency of brain power which is supposed to mark the African race may be thought by some to be a proof of the direct influence of heat on the brain. If the advantages of training and culture possessed by Europeans are taken into consideration, the superiority of the settlers over the natives in brain power is not so strongly marked as to lead those who have studied the higher races of Africa most closely to admit that inherent superiority in quantity and quality of brain which the white man commonly assumes to have. It will, I think, be found that, if the same amount of exercise be given to the reasoning faculties in the tropics as we give to them in Europe, the state of forgetfulness will not be reached, and the mind will retain its vigour unimpaired. But the usual incentive governing the white inhabitant of the tropics is the amassing of money. He may be said to be a man of one idea—I will not run the risk of causing offence by the use of a stronger term—and the man of one idea must necessarily allow most of the faculties of his mind to rust. His mind becomes weak from want of exercise, and he falls an easy victim to the tropical disease "loss of memory."

Nothing more powerfully contributes to shorten the white man's days than the habit of drinking strong spirits. The use of the alcohol of the apothecary is beneficial when a cold may have been caught, but the stomach should never become accustomed to it, for the habitual use of it deprives the blood of oxygen and causes it to give out an excessive amount of oxy-hydrogen gas. A very large proportion of the Africanders of the tropics, as the white settlers are sometimes called, will indulge in brandy on an empty stomach; before midday, perhaps, an emptied spirit bottle is sent flying into the street; and, in the afternoon, abundant evidence is everywhere forthcoming of the indulgence of the morning. The temperature of the blood rises dangerously near the fatal 102°, and, in their alcoholic excitement, such men will often over-exert themselves, producing excessive perspiration, followed by great thirst, and a further dangerous consumption of liquids. Oblivious of the danger, and heedless of the warnings of natives, and of wiser and older residents, they will frequently walk or repose in malarious places just when their heated, perspiring condition is most prone to the attack of miasma, and, if any harm then comes of it, the horrid "African climate" is held responsible. I would unhesitatingly refuse to a patient the mixture of water with brandy or with wine—a mixture erroneously, but almost universally, supposed to be beneficial in Africa. Some medical men, even, recommend the use of spirits to stimulate a failing appetite—a most unfortunate recommendation. If a man is not hungry when his meal-time arrives, it is far better that he should simply walk away from the table and wait till his appetite returns of its own accord. The absence of appetite will generally be merely an indication that his stomach is not yet ready to undertake a fresh task, and he should place it under no compulsion except such as can be naturally produced under the stimulant of bodily exercise.

White men in Africa are, as a rule, afraid to expose themselves to the changes of a tropical temperature, and this timidity is only too much encouraged by the advice usually given by medical men. By judicious exercise at different periods of the day and year, the body becomes accustomed to the changes that take place suddenly in the open air, and the exterior nerves so comport themselves as to prevent the internal organism from feeling the change too suddenly. The active duties of life make it imperative to encounter these atmospheric changes to a greater or less extent, and the body that is prepared for them is, therefore, in far less danger than the too-sensitive organisms of those who take too much care of themselves. The rapid swelling of the *papillæ* and the strong local *hyperæmia* experienced by sensitive persons on entering a hot climate, or on changing from a hot to a cold climate, may be set down to this cause, and the quick drying, cracking, and yellowing of the skin experienced by such persons are others of its results. The slightest exertion produces profuse perspiration, the respiration is diminished, and, through the undue activity of the sudorific glands, the kidneys are loaded with solid matter and the elementary organs are called upon to do more work, while the destruction of the tissues is stimulated and the work of the formative organs is retarded. On the other hand, when the nerves have been hardened by judicious exposure to the vicissitudes of the climate, they act admirably as regulators of the evaporation, prevent exhaustion after slight effort, while promoting a healthy degree of perspiration and maintaining a just balance among the various functions which the different organs of a healthy body are at every moment performing. "Be temperate in all things" applies to this, however, as well as to eating and drinking. Excess is always hurtful. Certain precautions must also be observed, but these will be considered further on among the remedial measures to be adopted in the tropics.

Of the peculiar diseases of tropical climates much cannot be said here, but it may be remarked that by far the largest part of the mortality in connection with them (excluding cases of malarial fever) results from the diseases which flourish everywhere, except in that ideal city of "Hygeia" which one of our most famous sanitary reformers has so happily imagined.

In the face of the ignorance of sanitary science which we find in European communities, it is, perhaps, not surprising to find that science entirely unknown in Africa. I was somewhat startled, however, to find that such an official as a sanitary inspector had scarcely been heard of, although there can be no place in all the world where the functions of such an officer could with greater benefit be performed than in the West Coast towns of Africa. The most appalling indifference to the presence of festering sewage in the midst of a town population pervades the inhabitants. Thousands of gallons of putrefying animal and vegetable refuse, in uncovered, or barely covered, holes in the ground, form cesspools close to the dwellings; and as they have many of them not been emptied for years and years, the nauseating mixture of urates and phosphates with free ammonia, sulphuretted hydrogen, and other gases that ensues is intolerable. The air, through the neglect and lazy indifference of the population, is loaded with horrors; and, when these people die of the poison they have themselves created, they say it is the climate that has killed them.

A sanitary inspector would make a radical change in the arrangements of the markets in these towns, though, in some of them, the buildings are handsome and convenient. No sight can be more disgusting than the butcher's corner, when closely, or, indeed, superficially explored. Out there in the sun, raw hides, a prey to legions of flies; up here, on dirty hooks, heads of sheep or cows, with heavy, creeping worms crawling languidly in the sockets of the eyes, and in the mouth; in another place, half putrid lungs hung up, like trophies, on steaming, dirty sticks; and everywhere unsightly lumps of unwashed meat, much of it lung-sick, to judge by the trophies overhead, but far too thickly incrusted with the black dust of the roads for the taint to be at once discoverable. Butchers, or butchers' helps, in dirty dresses, and with indescribable hands, seize these pieces of meat as soon as the market is over, throwing them into baskets which appear never to have known a scrub, and which, if scraped, would each produce a heap of solidified meat and blood, the accumulation of months, or it may be of years, of gluey stickings of meat. Outbreaks of yellow fever have been directly traced to the presence, on the roofs of houses or in the streets, of raw or half-tanned hides, festering and decomposing in the sun; and if it were not for the senseless habit of attributing every death to the climate, the great majority of fatal cases of disease might be directly traced to breaches of the commonest laws of sanitary science. With towns built on swamps, with malarious lagoons intervening between them and the pure breezes from the ocean, with impenetrable, unventilated bush shutting them off from the renovating air-currents from the land side, and with the rotting filth of a generation perpetually around them, the wonder is, not that the death-rate should be high, but that anyone should be able to resist the sum of these evil influences.

The following figures, given by the hospital authorities of Bathurst (Gambia River), tell the tale of sanitary neglect which I have attempted to reveal; but, as against the normal climate of the country, I deny their significance. They are worthy of the attentive consideration of the Central Government. During the past 20 years, the total deaths among the coloured population have been double the total number of births. The number of male deaths alone exceed, by 18 per cent., the total births of male and female children. The mortality among the males exceeds that among the females by 340 per 1,000. The highest rate of mortality is amongst infants from one year to seven years of age. Up to the age of 20, the death-rate diminishes, and then again increases to 40. Only a small proportion of the natives live beyond the age of 40. There are some Europeans, however, who have resided here for long periods. A French gentleman of my acquaintance has flourished in Bathurst for upwards of 17 years, and he has two or three compatriots, old residents. But Frenchmen are proverbially temperate—*verbum sat sapienti.*

Among the remedies to be adopted, none plays a more important *rôle* than normal bodily exercise. Exercise of a proper character maintains a normal circulation of the blood. The friction of the sanguineous globules one against another develops heat and energy, and, without doubt, electricity. Now, a tropical atmosphere is highly charged with electricity; and, unless a proportionate amount of counteracting electricity is developed in the body, a violent effect is exerted upon the nervous system, similar to that which may be produced by an electrical machine. A simple experiment in illustration of this theory would be very interesting. I think such an experiment would clearly prove that a person who is in the habit of taking, at regular intervals, a certain amount of exercise would be less able to resist the action of an electrical machine before, than after his usual exercise. It is known to everyone that the less exercise a person takes the greater is the fatigue consequent on exertion; so, in the tropics, those who take exercise the least feel most the oppression of the heat, and exhibit the least energy under it. Animals in a wild state will, after a certain rest, suddenly break forth into violent exercise, and if this, by any cause, is prevented, they soon begin to appear sickly, have a dull eye, an irregular pulsation of the heart, with respiration abnormally slow or quick, according to the nature of the sickness which the reduction of their vitality is sure to prepare them to catch. This is exactly the case with the human animal. Deprived of energy or electricity by want of exercise, his system is prepared for the attacks of fever or any other disease. A camel, ox, horse, or donkey, during, or immediately after exercise, will, sometimes, give as many as twelve electric sparks on being struck with a raw-hide whip, while, from the same animal, if deprived of exercise for a certain time, it is difficult to elicit a single spark. For a consideration, you may obtain from a negro permission to try the raw hide experiment, and you will, probably, be surprised to find that an industrious negro, on being lightly struck, will give two, and sometimes three electric sparks, while, with far greater force, you will not be able to extract a single spark from a lazy negro. On a dark night, an emanation of electricity, forming a sort of halo, may be observed round the body of a perspiring negro, resting, after vigorous labour, upon a bullock's hide, and sparks will not unfrequently be emitted from his body during his movements in sleep. Similar effects I have never observed from a native known to be lazy and afraid of work or exercise.

Moderate exercise is, again, necessary in order to maintain the fluidity of the blood. Rapid evaporation of the watery particles in the blood takes place through the strong perspiration which is the natural consequence of climatic heat, and, unless means are adopted for replacing the water, the blood rapidly thickens, and circulation is impeded. Many doctors recommend avoidance of exposure to heat, as far as possible, and also avoidance of exercise, as the best means of preventing a too rapid evaporation of the aqueous portions of the blood; but, in spite of every device, the heat cannot be altogether avoided, and evaporation cannot be prevented. Indeed, it must not be prevented, for, without it, the skin would become parched, and, refusing to perform its functions, the blood would then be thickened by the accumulation of internal heat. Too profuse perspiration is undoubtedly exhausting, but the long absence of perspiration would cause a rapid increase in the temperature of the blood, and a condition of still greater danger would thus be speedily created. Though moderate exercise will provoke perspiration, and augment the evaporation of the watery particles, a more than equivalent quantity of moisture is returned to the blood by the quickening of the respiration which the exercise effects. With or without exercise there must be evaporation, and consequent loss of fluidity; but exercise affords a means of regulating the fluidity with the greatest nicety, and, therefore, of maintaining the normal condition of the circulation of the blood. It is calculated that, with each respiration in a moderate temperature, 1·62 cubic inches of oxygen are supplied to the lungs, and, allowing 20 respirations per minute as the average, the daily requirement of oxygen amounts to 26 cubic feet. The total amount of air for such respiration is, on the average, 20 cubic inches, which, at 20 respirations, would represent 400 cubic inches per minute. Of this quantity, 4 per cent., or 16 cubic inches would be carbonic acid. The oxygen, which is the chief constituent of atmospheric air, combining with hydrogen, supplies to the blood the watery particles required; and it is evident, therefore, that an increase of the rate of respiration by exercise will promote the circulation of the blood by increasing its fluidity, as well as by the production of electrical energy. The researches of Lehmann and of Scharling have given to science some valuable data respecting the functions of the respiratory organs, of which the enlightened student of tropical diseases should not fail to avail himself. Lehmann discovered that, in a moist atmosphere, the quantity of carbonic acid exhaled far exceeded that which the same body would give off in dry air, and that more is given off in winter than in summer. Scharling has found that the exhalation of the same vapour from the body, during sleep, is considerably less than in the waking hours. In the climate of Mid-Europe, the latter investigator observed that, for 22·77 grains of carbonic acid exhaled per hour of the night, about one-half more was given off during the same period immediately after the midday meal, the exact hourly proportions throughout the night and day being as 31·39 to 40·74. Violent exercise, under most circumstances, should be carefully avoided, but moderate exercise I most strongly recommend. White men in the tropics, whose circumstances permit them to abstain from bodily and mental exercise, are never so healthy as those whose occupations compel them to exercise both body and mind to a moderate extent. It is an undoubted fact that, in these regions, an industrious man, whether white or black, always looks more healthy than a lazy one. In dry regions much more exercise may be taken without fatigue than in damp, swampy districts, and, in the former, both men and animals are more muscular, energetic, and graceful in form than in the latter, where the natives are not unfrequently lank, tall, and attenuated.

The rule of life I would lay down for a resident of the tropics is based upon the words "diet, exercise, and energy." These are the man's climate —his life—the power of the intellect nourished by the normal blood. The rule of life adopted by most Europeans in the tropics, so far as they can be said to have any rule, appears to be "feed and rest, rest and feed." Few give any intelligent consideration to the subject of the preservation of health, and many do not even take the trouble to consult a medical man unless at some serious crisis, when, as it generally happens, the physician's aid has been sought too late. They will take quinine in absurdly large doses, literally eating it with a spoon, and calomel they consume in alarming quantities, but of the advantages of small doses the majority of the settlers appear to be profoundly ignorant. A pinch of quinine, taken at the moment when a fever attack is first perceived will be of great benefit; but this valuable drug should only be used when actually required. It is worse than useless to take it beforehand, as many do, as a precautionary remedy.

Moist heat is generally believed to be dangerous but there is every reason to think that it is not the heat accompanying the moisture which does the mischief, but the moisture alone. Dry heat is undoubtedly beneficial, and the moisture of the tropics is as certainly hurtful; but the most dangerous moment of exposure to moisture is that part of the night when it is most cool. Given two malarious towns, equally moist, and in all respects alike, except thermally, the sickness would be less in that town of the two which has the highest average temperature, and the least range of variation. The average temperature during the dry season is considerably higher than during the rainy season, yet it is the latter which is most prolific in causing disease. The most prevalent diseases at this time are dysentery, diarrhœa, cholera, and yellow fever; all, except the last, common to temperate climates. Rheumatism and gout are also prevalent, but these are generally either inherited or caused by careless exposure to damp, by debauchery, or by neglect. Goître, a swelling of the thyroid gland, is a disease much more frequently met with in the moist districts of the West Coast than elsewhere. The natural remedy for all these evils is the advent of the Harmattan winds, which, as soon as they begin to blow, change the land of mourning into a land of joy. The noxious moisture is dried up, and the sick recover as if by magic. These drying winds blow regularly from December to February.

The natives have a simple and very sensible method of warding off the pestilential moisture of the swamps. They plant groves of trees between the swamp and their villages. This is found very effectual; probably, because the trees intercept or absorb the malaria, and prevent its being projected into the midst of the population by the wind. They, at other times, burn the bush, and the soil, then becoming exposed, acquires a crust which impedes the rising of the vapour. If a little rises, it is either dissipated or largely diluted by the wind, and rendered harmless.

In the British possessions such obvious means of protection appear to be either unknown or despised. Here and there traces may be found of something in the nature of a remedial attempt; such, for instance, as the ditches constructed at George Town, to carry off the surplus water to the Gambia River. But these attempts have all proved total failures, partly from the fact that the works were constructed without sufficient data, and partly from subsequent neglect.

Let me ask:—Do the British authorities at home know of these things? Are the agents of the Government interested in the development of England's greatness, and in promoting the welfare of the subject races over which she rules? Are they interested in holding the torch of truth over these dark parts of the earth, or is it their interest to keep back the light? Are there among them men willing to spend themselves in the endeavour to plant the health and comfort of civilised communities on the neglected soil of Africa, or have they all enwrapped themselves so securely in the mantle of egotism as to be unable to look beyond their own interests?

In England, there is no lack of men anxious to learn the truth, in order that their sympathies and their benevolence may be directed upon worthy objects. But there is also, here and abroad, a class that profits by the abuse of those sympathies. The worst of these are the writers of books with sounding titles, which, under pretence of extending our knowledge of tropical countries, deceive us with accounts of pseudo or superficial travels. Such publications progagate the errors of others, do much harm to simple, but well-meaning races, and retard the progress of a mighty empire, in order that a little name may figure for a day on the title-page of a book.

DISCUSSION.

The Rev. Horace Waller wished, in the first place, to offer a tribute of thanks to Mr. Mitchinson for his paper, for the broad view he had taken of things African, and for the hopes he had expressed that a little more exercise of common sense would do away with many of the evils which had kept Europeans from that great continent. He only regretted that the author had not been able to give in more detail the result of his observations on African fevers, and their effects on different constitutions. He would venture to supplement the paper by some details gathered from his own experience, and from that of some medical men who did all they could to instil into him some medical knowledge, viz., Dr. Livingstone, Dr. Kirk, Dr. Mellor, and the late Dr. Dickenson. In Africa, there were several things absolutely necessary to be observed, in order to preserve health. In the first place, the choice of a site for a camp was very important; men often chose a nice expanse of sand, which seemed dry and clean, but nothing could be more fatal; he would far rather encamp even amongst the reeds and rushes; and Dr. Livingstone had suffered very much on some occasions from the same cause. It was probable, that during the wet season, decayed matter was brought down with the sand, and lay buried some distance below the surface, where the fierce heat of the sun caused it to ferment and give off malaria. Again, no one should camp in a hollow. In Africa, you might walk into a hollow, and feel almost as if you were going into cold water; but people sometimes fancied that being in a hollow they were sheltered. A camp should always be on rising ground. All Englishmen were fond of their tub, and many would stick to their plunge in a cold stream; but this was a mistake. Naval surgeons, &c., in the East Indies, had come to the conclusion that men must not indulge in cold bathing in the East as they did in England, and he could add his own testimony to the danger of doing so. They should be content with a bucket out of the river or stream, and sponging themselves. Then, again, the question of dress was very important. Flannel should be used, but with discretion; and, above all things, nothing should be worn tight round the neck. *Coup de soleil* was commonly caused by pressure on the large blood vessels, preventing free circulation; the kind of head covering was not of much importance, so that it was sufficiently thick. Dr. Livingstone usually wore an ordinary navy cap, and never had anything like sunstroke, except on one occasion, when the sun poured in on him through a hole in the roof of a hut where he was sleeping. It was also important that the stomach should be carefully covered with a thick waistband of some sort, which was the invariable custom of the Arabs. In the alluvial districts, where pathways had been made, the soil was very black, and the radiation of the sun's heat most intense; even the hard-footed natives sometimes could not walk on them; and on such occasions he had found that if the abdomen were not well protected, a deadly faintness would come over one, which was the premonitory warning of more serious mischief. With regard to feeding, he must join issue a little with Mr. Mitchinson. He had tried both plans, and his decided opinion, based on experience, was, that by a good supply of tea, coffee, sugar, and, above all, wheaten flour, preserved soups, meats, &c., the men now living at Livingstonia were, to a great degree, kept in good health. Of course, none of them were likely to exceed in anything, but he believed their health depended in a great measure on the commissariat. With regard to stimulants, of course the common sense of everyone agreed that they were simply destructive; in his opinion, there was nothing better than coffee, morning, noon, and night. He had taken a great deal of medicine, and had given a great deal, and he did not believe any friend of the human race was ever so much abused as quinine. The Admiralty regulations prescribed that men on the African rivers must take a dose of quinine every day; but he believed you might, by this process, beget a kind of fever in any one, make him nervous and anxious, and worry him into that state in which fever would easily attack him. You should not make men fancy they were ill, by continually looking at their tongues and feeling their pulse, but keep up their spirits as much as possible, and not give them quinine until it was wanted. If quinine would not cure fever, nothing would; but it sometimes happened that even that was of no use, unless a previous dose of calomel, to act upon the liver, had been given. There was also another medicine, of which he had no personal knowledge, but had heard it very highly spoken of, called Warburg's drops; quinine was one of the constituents, but it was combined with various aromatic essences, which were thought to have a very good effect. Next came the question of sleeping; he would not allow any man to sleep without a mosquito curtain, which he believed to be of great service in keeping off malaria. The moisture of the air became deposited in the fine meshes of the net, and acted as a screen, and it was commonly said, and he believed was the case, that malaria would not pass over water Another evil to guard against was the sudden fall of temperature, which took place early in the morning. Men went to sleep under the mosquito curtain, in the most intense heat, and slept heavily; but about four o'clock they would wake up and feel chilly, and pull the blanket over them; but it was then too late; those who said at breakfast that they had woke up chilly, would be sure to have the fever. There was a kind of dress, called, he believed, a "Laming suit," which sailors were obliged to wear at night in tropical countries, consisting of a pair of high trousers, covering the abdomen, a sort of pea jacket, made of flannel, with a large collar which could be pulled up round the head, and this was a most excellent thing; but where this was not worn, men should accustom themselves to wake up early, before the chill came on, and pull their blanket up round them, so as to avoid taking cold.

Captain Foot, R.N., said he could endorse almost all which had been said by Mr. Waller, though, perhaps, that gentleman had been a little hard on quinine. Most of his time in the service had been spent in the tropics, India, China, Central America, the West Coast of Africa, and the East Coast, and he had had a great deal to do with fever. He had had most of the West Coast fevers, including yellow fever; but his last trip was to Zululand, where he joined the Naval Reserve, and from there he went up to Zanzibar, and back again, and had no fever at all. He followed the advice of a naval surgeon, and for ten days or a fortnight previously, took a moderate dose of quinine, which he thought acted as a protection. He also agreed with Mr. Waller that good living was essential. In hot climates there was a great drain on the system, both physical and mental, and even moral, and the meat afforded by the goats, sheep, and fowls of the country was not, in his opinion, sufficiently stimulating to the digestive organs. Preserved meats and Kopf's essences were of great value, therefore, to the traveller. A mosquito curtain was no doubt a filter to the malaria, and he would sooner go without his whole baggage than miss it, although, fortunately, mosquitoes did not hurt him. The "Laming suit" was a very good thing, light, cheap, and easily made; and he knew, from experience in India, that a sudden fall of temperature occurred in the early morning. He thought regularity of meals a great advantage where it could be obtained. With regard to stimulants, the men had their usual allowance of rum, and when they were boat cruising a double allowance, with sometimes the quinine mixed with the rum, or a little sherry. They looked forward to these little things, and he thought it did them good; they did not, of course, get it in the heat of the day. It was a great thing to keep men cheerful and in good spirits; as he often told them, a good laugh would do them more good than all the quinine. If persons were not accustomed to stimulants, of course, they would be better without them, but those who were used to take them in moderation, were, he thought, wrong to drop them suddenly on going to a hot climate. Wherever it is practicable, as in the case of fixed stations, distilled water should invariably be used for domestic purposes. Mr. Harvey, the chief engineer of the *London*, has suggested two very excellent forms of condensing apparatus, for the preparation of distilled water at stations. The mind had a great deal to do with all these matters, and allowance must be made for habit. He hoped this paper would be the means of showing that Africa was not nearly so black as it was painted, but that it was a country in which Europeans could live quite as well as in India.

Dr. Thin said this subject was one which came constantly before him in the course of his practice, and he was the more interested in it from having practised some years in China. He had been pleased and instructed, both by the paper and Mr. Waller's remarks; but one thing must strike every one who had listened. There seemed a consensus of opinion that if you took certain precautions you might go to these countries and live there with comparative safety, but then, what a number of precautions you had to take, which no one ever thought of if they went to Germany, Canada, or France. The very fact, that most experienced men found it necessary to take these precautions, showed at once that you were running great danger, and that if you made the slightest slip in your mode of life you might die. This was not only a matter of fact, but it was his firm conviction, and it was confirmed by the practice of all life assurance societies; and his opinion, which was confirmed by his practice in London, was, that these climates were all bad, and that if any man thought his health was the first object, and he wanted to live as long as he could, he should never go to any of these climates, because he would certainly run risks which he would not by remaining at home. A physician in London, of great experience in the diseases of women and children, informed him that he could at once tell when he saw a European child, born in India, come into his consulting-room, without asking a question; and he (Dr. Thin) could almost do the same. If you wanted to test the healthiness of a country or an occupation, you did not choose a strong, vigorous man who went into it in the prime of life, and left it after four or five years, but you took a weak man, and if he could not stand it, you said here is a country or an occupation only fit for the strong and vigorous. There were men born that nothing would kill short of actual violence; some could go to India to live to 80. With regard to diet, his conviction was that the less people thought about what they ate and drank the better. Nothing astonished him more than to find people coming to him, very often young men, asking him what they should eat. The best thing was for people to live in a quiet, orderly, regular way—very much as they did at home. It was utterly useless to attempt to follow the example of the natives, whose constitutions had never been accustomed to the food and habits that Europeans employed. When in China, he recollected people who had consulted physicians before they came out as to the best way of living in a tropical climate, and they often had very bad advice, which made them ill. They were told not to eat animal food, but to eat rice; they got ill, anæmic, and fell victims to their intense prudence. With regard to quinine, he believed it would no more prevent a man having fever, if he took it before he was exposed to malaria, than taking an antidote for arsenic to-day would prevent his being poisoned by it next year; but quinine would act as a prophylactic in this way. People who lived in malarious countries imbibed the poison into the system without having fever, but they might come back to this country, and on getting wet and chilled, have an attack of ague. Only last summer, a gentleman went to Borneo for a few months, and returned; he had no fever out there, but when he landed at Marseilles he took cold, and had a severe attack of ague. Very possibly, if he had taken quinine on the island, it would have counteracted these effects. When a man had the fever, there was nothing for it but to get the quinine into him as soon as possible. But there was no doubt that the habitual use of the drug had very great disadvantages; one was, that it certainly injured the hearing, and it certainly produced nervous disorders; therefore, if a man could not live in one of these countries without taking five grains of quinine a day, the sooner he got out of it the better. One peculiar symptom produced by quinine in some people he had never seen noticed; but he had a patient at the present time who, if he did not take a warm and generous meal within ten minutes after a very moderate dose of quinine, trembled, and became faint, and exceedingly ill. With regard to the use of alcohol, they all knew it was used freely in all these countries, and he believed it always would be; for the simple reason that the depression and exhaustion which made people resort to it here, were perpetual there. Men worked 12 and 14 hours a day, both physically and mentally, and when meal-time came they had no appetite. But they had more work to do, and must eat, and therefore they took brandy and soda, or some effervescing drink with alcohol in it, a cocktail or something, and then they were set up and could eat. At the same time he was satisfied that doing this from day to day, and month to month, laid the seeds of arterial degeneration, degeneration of the heart, exhaustion of the system in many ways, and of anæmia. They found out there men of 40 suffering from the diseases of 70 in Europe. Alcohol might help them over the day; and they could not always afford to consider what was most conducive to longevity, but it was in the long run pernicious. With regard to the danger of suddenly discontinuing alcohol, he had some experience when abroad. Ladies suffered much more from the climate than men—another sign of the badness of the climate—and they naturally resorted, as other people did, to stimulants; frequently it was ordered by the doctor, and by and bye they fell into the habit of taking it. He found this in his own practice, and was alarmed at it. He made it a rule, whenever he saw any bad result, simply to say stop taking alcohol in any shape or form, and in every instance in which he gave that advice, it was followed with benefit to the health. There might be hysteria, tears, depression, and so on for a week or two, but at the end of a few months the patient always said it was the best advice she had ever had in her life. *Delirium tremens* was not uncommon in these countries, and it was very fatal – another sign of the badness of the climate. In such cases he always made it a rule to stop alcohol immediately, and almost invariably the patient's life was saved. Naturally, in these countries, there were few abstainers, but amongst the few he knew the health was excellent.

Dr. Mann said the principal object of the paper appeared to be to show that the main causes of disease in tropical countries were preventible, and with that he cordially agreed. There could be no question with anyone, who had seen much of warm climates, that very much of the disease which was experienced was due to personal habits, which were within control. On the other hand, there could be no doubt that serious and grave diseases did sometimes come in tropical climates, after long exposure, to those who lived the best lives men could live. There was no argument that tropical countries were healthy places, but it must be remembered there were unhealthy countries to which men were led by a sense of duty, feeling that they had opportunities of usefulness there which they had not at home; and when they did go, it was surely important that they should go with a strong conviction in their minds that if they learned to do their duty well and fairly, instead of badly and unfairly, their chance of carrying their work through to a successful end would be much greater. That was really the gist of Mr. Mitchinson's argument. He was convinced that the truth would be found to be essentially in the mean, and not in either extreme. We must take the rules of common sense and apply them as far as possible. A great thinker had defined science as organised common sense; that was a good definition, and practical men ought constantly to strive so to organise common sense as to bring it to bear on the work which lay around them in daily life.

Mr. Hyde Clarke said he had been much struck with Mr. Mitchinson's allusion to the systematic practice in Africa of planting trees so as to intercept malaria. He had himself never known of that being done, but he did know an instance of a converse case, where a large village, of about 400 stone houses, had been deserted for 60 years, no one being able to live there in consequence of a grove of trees, which had sheltered it from malaria, having been cut down. It was very important in selecting a site for a camp or station to note the prevailing winds, and not to choose a spot exposed to miasmatic influences. It was also important to avoid cultivation too close to the station; and he had little doubt that the difference in the health of the different regiments in Cyprus were caused by the ground being broken up more in one camp than another. He remembered a case where a town was built in a healthy situation, and where the people were free from fever for two years; but in the third, it broke out at one end and went through the whole place, simply because some Englishmen thought it was a pity such good soil should be uncultivated, and, contrary to the regulations, got planting potatoes or something of the kind. He remembered when Dr. Livingstone appeared once in that room, he had to apologise for his unfamiliarity with English, like Mr. Mitchinson, from having been so unaccustomed to it; but he must say he did not think the administrative authorities on the West Coast were all quite so neglectful of sanitary measures as Mr. Mitchinson seemed to imply. Mr. Pope Hennesey was certainly not unmindful of the welfare of those over whom he was placed, though he was not long continued in his African government; and he thought great consideration should be shown to the men who undertook such responsible and dangerous duties.

The Chairman said it appeared that Mr. Mitchinson attached very little importance to what were termed meteorological changes, which he looked upon as rather incidental to bad health and mortality than anything else, and that he considered the main causes of mischiief were bad sanitary conditions, and improper food. Then he mentioned certain physiological facts, which were of great interest and importance, and thence he had gone on to suggest remedies for tropical diseases; and, finally, he had referred to the great carelessness which existed on this question. On some of these points the preceding speakers had not touched at all; for instance, the physiological facts, and the carelessness of the public, had only been referred to by Mr. Hyde Clarke, who, to some extent, vindicated our public men from the charge of indifference in this matter. Some facts were of leading importance, and about them there was no difference of opinion. Thus, with respect to the use of alcohol, everyone spoke with some authority from experience, and all bore evidence on one side; for Capt. Foot had spoken with extreme qualification as to the use of alcohol at all, admitting that it should only be employed by those to whom it had become, not physically, but morally, a necessity; and those whose experience lay in the metropolis, often met with the same class of cases, to whom they were obliged to allow it, for the same fancied reason. Barring this one objection, there was a consensus of opinion that in tropical climates the effects of alcohol in every form were ultimately prejudicial, and that there, at all events, alcohol could not be accepted as a food. He might say, incidentally, that if they had been speaking of the Polar regions, the same argument would just as well obtain; and if they turned to their own country, and looked at what had been going on during the past few weeks, they would see again the same story. During the extreme strain to which people had been subjected, by the astonishing condition of cold, combined with wet and fog, no enemy had been found so fatal in combination with this as alcohol. There were one or two points on which some speakers seemed somewhat at variance, but in reality were not so. For instance, on the question of meteorology, Mr. Mitchinson took a different view altogether to Dr. Thin, but both were, to a certain extent, right; because in the use of the word miasma, which the former introduced freely, he admitted the influence of meteorological conditions. You could not conceive of miasmatic conditions without bringing in meteorological, whatever view you took of the nature of miasma—whether you considered it a particular change in the substance of the body—a living substance, as some supposed—or, as Mr. McLaren suggested some years ago, as being nothing more than a peculiar condition of water in the atmosphere. But there was a great deal to be said with regard to meteorological changes as affecting the condition of the individual. There were changes, of which, at the present time, we had no direct knowledge, which influenced us irrespective of our mode of life. The large number of sudden deaths which had occurred of late could be attributed to nothing but atmospheric conditions. Certain seasons were connected with certain diseases. Some time ago, he published an essay on this subject, in which he showed, among other facts, that scarlet fever doubled in mortality from November to February, as compared with its mortality from May to August. Even if there were the same number of cases in the summer months, there would be a much lower mortality over a range of years than in the colder ones. Again, we did not live in the same way during one season that we did in another. In November, we all began to lose in weight, and went on wasting until May, when we began to increase. In November also we began to give off more carbonic acid; in the winter our venous blood was intensely dark compared with the arterial, but during the summer we could scarcely distinguish the difference by the colour, and in the tropics could not do so at all. The late Dr. John Davy, when living in India, actually sent home a paper to disprove that there was any difference in colour between the arterial and venous blood, not conceiving it possible that there should be so much difference in oxidation in the tropical as compared with the colder climate. He had himself once traced out the ratio of mortality, after great surgical operations, in reference to meteorological changes, and found that with a falling barometer there was a higher mortality than with a rising barometer and a dry atmosphere. They could not therefore throw over meteorology, though that in no way clashed with the conclusions drawn as to bad sanitary conditions and bad feeding. As Dr. Thin had said, in tropical regions there was more strain and exhaustion, and we had to consider, with more care than we need here, the way in which we lived, just as more care must be taken here than in Mexico, Colorado, and some other places where exceptionally equable conditions prevailed. With regard to the power of the human body to bear climatic changes, he might draw attention to the case of the Jews. Michael Levy, the great hygeist, declared that a Jew could live anywhere, and wrote a paper on the subject; but if the proper explanation were arrived at, he believed it would be found that they lived in tropical countries better than the rest of the world, simply for the same reason that they lived better in Frankfort, London, or elsewhere; they lived much more simple lives; they were notoriously temperate in the use of alcoholic drinks, and were frugal and careful in the matter of food. Whether the Jews would continue to enjoy the same advantages now that they were getting richer and more luxurious, he was inclined to doubt. Mr. Mitchinson had referred to the possibility of building cities or towns anywhere, and he largely agreed with that view. Some of the figures he had quoted showed that, even in the tropics, the mortality was very little in excess of many towns in England. In Liverpool it had been nearly as high as at Bathurst on the Gambia. If he had money and command of engineering skill without limit, he could build a "Hygeia" anywhere where there was a good foundation, where food could readily be obtained, and where roads could be constructed. Any part of the earth's surface could be made the site for a model city, and that would be the work of the future, perhaps. If, as Dr Maudsley suggested, the earth cooled down, so that our posterity had to live in snow huts near the Equator, it would become a question how these equatorial cities should be built. Several of Mr. Mitchinson's physiological statements were somewhat crude, though interesting. He was not sure that he knew what he meant by the oxy-hydrogen produced in the body, nor the combination of oxygen and hydrogen in the body. He assumed that he probably referred to some experiments which had been made to endeavour to prove the oxidation of hydrogen in the body, but that discovery had yet to be confirmed. It was at present only a speculation, arising from a calculation that the amount of water taken as food in various ways was not sufficient to form the 75 per cent. of which the body was composed. Again, with regard to the electrical phenomena mentioned, he had never heard of such things having been observed. Some experiments had been attempted, tending to show that, during or after exertion, the body was positively electrified as compared with the atmosphere, and when in a state of exhaustion, negatively, and these experiments, which were conceived many years ago, had been too much neglected; it was also possible that some electric change took place connected with the presence of the water in the atmosphere, when the body got very much depressed in the presence of aqueous vapour; but as yet these were only speculations, stimulating inquiry, and not standing on any experimental basis. He agreed with Mr. Mitchinson as to the dense condition of the blood, which resulted from extreme heat. If the water were removed in large quantities, the blood became, not coagulated, but inspissated, and ready to take up a large quantity of water; and under these circumstances, its vital power was lowered. A remarkable instance of this occurred some time ago, in the practice of a noted physician in Dublin. A woman under his care suffered just the same as if she were in in a tropical climate. She was constantly perspiring, relaxed, and faint. After death she was found to have a peculiarly diseased condition of the heart, by which the oxidised blood, after it had come from the lungs into the left side of the heart, passed back into the veins by an opening in the heart itself; so that she was always having extremely oxidised blood distributed over her body. In such a condition, a free but not excessive quantity of drink should be taken. Exercise was also beneficial, as it no doubt led to a greater determination of food towards the blood; and, lastly, under no circumstances, should a large quantity of water be taken when the blood was in a dense condition. He concluded by moving a vote of thanks to Mr. Mitchinson for his paper.

Mr. William Botly, in seconding the resolution, said he was acquainted with a Major-General who had served 21 years in India and tropical climates, but who never took alcoholic drinks. He was now about 60, and went through a day's walk or any kind of exercise with as much zest as a young man.

The resolution being passed,

Mr. Mitchinson, in reply, said he regretted that he had not had time to develop the physiological aspect of the question so fully as he should have liked, and as he hoped to do on some future occasion. He did not, however, mean to say that meteorology had nothing to do with the question of health in tropical climates, but that it had much less than other controllable influences.

ELEVENTH ORDINARY MEETING.

Wednesday, February 18th, 1880; Field-Marshal Lord Strathnairn, G.C.B., G.C.S.I., in the chair.

The following candidates were proposed for election as members of the Society:—

Baker, Chas., 60, Francis-road, Edgbaston, Birmingham.
Heaton, Charles W., F.C.S., Charing-cross Hospital, W.C.
Hoe, C., 44, Leadenhall-street, E.C.
Mole, Frederick M., Granville-street, Birmingham.
Moon, Ernest Robert, 2, Temple-gardens, E.C.
Plant, George William, 145, Queen Victoria-street, E.C.
Parkes, Sir Harry Smith, K.C.B., H.B.M. Minister, Japan, and Athenæum Club, S.W.
Underhill, Arthur, M.D., Great Bridge, Tipton.

The following candidates were balloted for and duly elected members of the Society:—

Archbold, Ralph S., 2, New Broad-street, E.C.
Batty, Edmund, 2, Eslingden-terrace, York.
Berens, Rev. R. M., Sidcup.
Jones, Rev. Alfred, 117, Gunnergate-terrace, Middlesbro'.